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MANGANESE SULPHATE SPRAYS FOR VEGETABLE CROPS

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The yellowing of vegetable crops growing on slightly acid to alkaline soils is frequently due to a deficiency of available manganese. This element, which seems to be essential for the production of chlorophyll in plants, is nearly insoluble in soils having pH values from 6.2 to 8.0. Too much lime in a soil will create such a condition; it exists naturally in marl and limestone soils, and may occur also as the result of burning peat or muck soils. Where the amount of manganese is naturally low, this partial insolubility will create a deficiency in the amount available for the growth of plants.

Experiments have shown three ways in which manganese deficiency may be overcome. These are by applying manganese to the soil, by making the soil more acid or by spraying the plants with a solution of manganese sulphate. Additions of manganese sulphate with the fertilizer produce a concentration of available manganese sufficient for the growth of one or two crops on neutral or alkaline soils. Usually 25 to 50 pounds of manganese sulphate per acre per year will maintain production on peat soils which are neutral or alkaline in reaction. Somewhat more than this is required where the peat soils show large amounts of brown ash.

It is possible to increase the availability of the manganese in a soil by making it more acid. This can be done by the application of sulphur. The amount of sulphur needed will depend upon the type of soil and its alkalinity. For burned peat soils in the Everglades the use of 50 to 100 pounds of sulphur per acre is sufficient, except where the soil contains large amounts of ash.

Neither of these methods is more effective than spraying the plants with manganese sulphate solutions. Experiments with beans on burned peat soils in the Everglades have shown that the yellowing due to a deficiency of available manganese can be prevented by the application of manganese sulphate solutions to the foliage of affected plants. Beans which have become very yellow will recover and produce a normal crop after being sprayed with manganese solutions. Usually one application is sufficient, but two or three applications will be helpful where the soil is quite alkaline.

Spraying with manganese is more economical in material than the use of manganese or sulphur in the fertilizers because less manganese is needed. It has been found that 10 pounds of manganese sulphate sprayed on an acre of beans is as effective as 25 to 50 pounds applied with the fertilizer. Furthermore, it is not necessary to apply the spray until the need is shown by the plants, while soil treatments must be made before the need is shown. Spraying is more effective on the most alkaline soils where manganese applied to the soil is rendered insoluble in a short time.

Yellowing of the foliage alone is not always a sign that manganese is needed. It may occur from a variety of other causes of which root-knot, root rot, a flooded soil, and deficiencies of copper or zinc are common. When the yellowed plants are growing on burned peat or marl soils one may be practically certain that a deficiency of manganese exists. Bean plants growing on such soil will be green for two or three weeks and then begin to show a yellow mottling between the veins of the leaf. In the later and more severe stages of the disease, the bean leaves become golden yellow, and often have small dark spots along the veins. Ultimately the plants die. If there is any doubt as to the cause of the yellowing a few plants should be sprayed with a manganese solution. The normal green color will begin to return to sprayed foliage within 30 to 48 hours if there has been a deficiency of manganese.

The usual procedure for spraying is to dissolve four pounds of manganese sulphate in 50 gallons of water, and to apply this solution with knapsack sprayers. Fifty gallons of the solution is enough for an application on one to one and a half acres of vegetable crops. For crops such as beans no spreader need be mixed with the spray. When peas or cabbage are to be sprayed the use of a soap spreader is advised. Lime may be added to the solution if there is any tendency to burn the foliage with the manganese spray. This seldom happens, however, and the addition of lime is not recommended for spraying beans, peas, potatoes, and tomatoes.

When it is desirable to apply other sprays, the manganese may be mixed with them. Some recommended mixtures are given below:

4 pounds 83% manganese sulphate
50 gallons water

4 pounds 83% manganese sulphate
2 pounds 89% zinc sulphate
50 gallons water

4 pounds 83% manganese sulphate
50 gallons 2-3-50 bordeaux mixture

Manganese sulphate is available at growers' supply houses, where it usually may be had in two grades. One grade is a granular yellow material suitable for use in fertilizers. It contains 63 percent of manganese sulphate. The fine gray powder used for mixing manganese sprays contains 80-83 percent manganese sulphate and is readily soluble in water.